7-8 Inverse Functions and Relations

ex:
y = 3x

(1, 3)

(2, 6)

Change equation so that you would get (3, 1) and (6, 2).

$y = \frac{1}{3}x$

ex:
y = x + 5

(1, 6)

(2, 7)

$y = x - 5$
(6, 1)
(7, 2)

ex:
y = 3x - 1

(0, -1)

(2, 5)

~~$y = \frac{1}{3}x + 1$~~
(5, 2) (-1, 0)
$y = \frac{x+1}{3}$

These equations are inverses of one another
(switching of x and y)

Using function notation:
f(x) = 3x - 1 $f^{-1}(x) = \frac{x+1}{3}$

"f inverse of x"

f(0) = -1

$f^{-1}(-1)$ = 0

f(2) = 5

$f^{-1}(5)$ = 2

If f(a) = b, then $f^{-1}(b) = a$.

Given the relation:
{(3, 3) (2, 5) (-2, 5) (-2, 2) (-1, 2) (-1, 3)}

Find the inverse relation.

{(3,3) (5,2) (5,-2) (2,-2) (2,-1) (3,-1)}

Finding the inverse.
ex:
$f(x) = \frac{-1}{2}x + 1$

1. change to y =
2. switch x and y
3. solve for y
4. change to $f^{-1}(x)$ =

$y = \frac{-1}{2}x + 1$
$x = \frac{-1}{2}y + 1$
$x - 1 = \frac{-1}{2}y$
$-2(x-1) = y$
$f^{-1}(x) = -2x + 2$

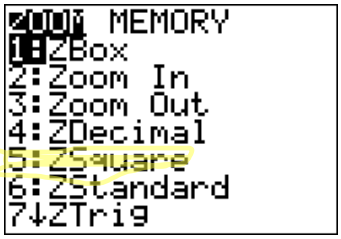
Find the inverse:

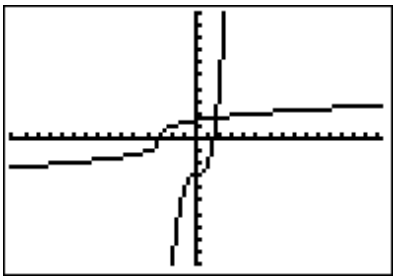
1. $f(x) = \frac{3}{4}x - 6$ $f^{-1}(x) = \frac{4}{3}(x+6)$ $\frac{4}{3}x + 8$

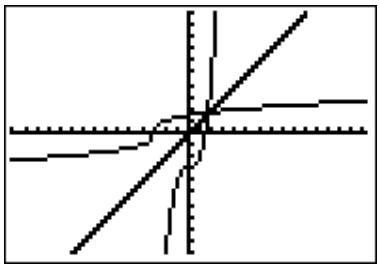
2. $g(x) = \frac{x+2}{3}$ $g^{-1}(x) = 3x - 2$

3. $f(x) = x^3 - 3$ $f^{-1}(x) = \sqrt[3]{x+3}$

After finding the inverse, graph #3 and the inverse on your calc

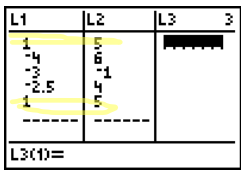


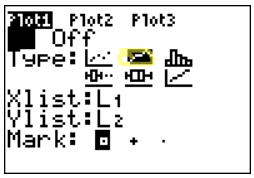


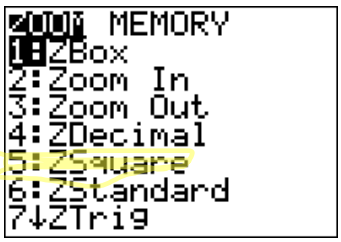


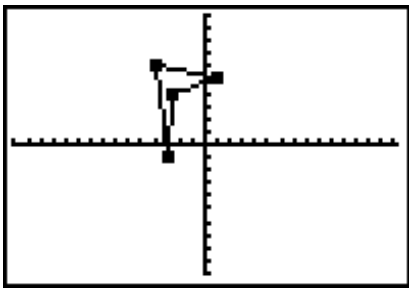
The graphs of a fn + its inverse are symmetrical along the line $y = x$

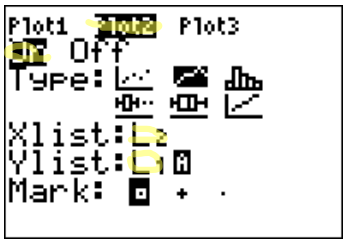
Graph the relation and its inverse:
{(1, 5) (-4, 6) (-3, -1) (-2.5, 4)}

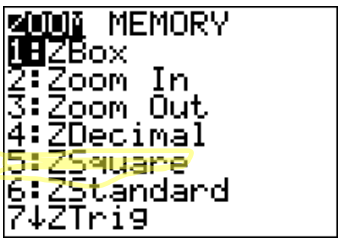


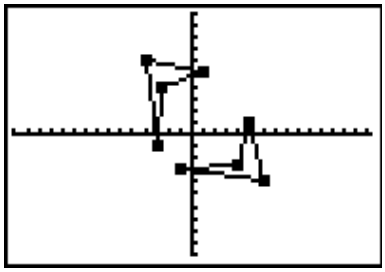






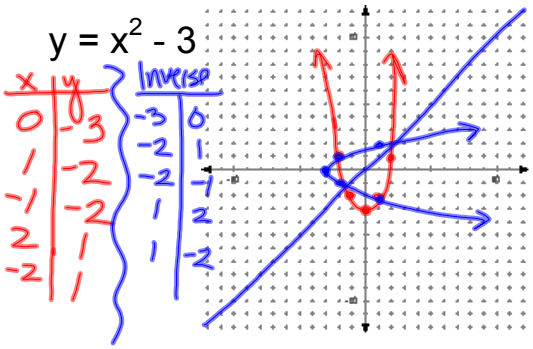






Sketch the inverse.

$y = x^2 - 3$



Show that two functions are inverses of one another

Two functions are inverses of each other iff the composition is the identity function.

$I(x) = x$ (y = x)

$[f \circ g](x) = x$ $[g \circ f](x) = x$

Show $f(x) = \frac{-1}{2}x + 1$ $g(x) = -2x + 2$ are inverses.

Do:

$[f \circ g](x) = x$ ✓ $[g \circ f](x) = x$ ✓

$f(2x+2) = -\frac{1}{2}(-2x+2) + 1$

$= x - 1 + 1$

$= x$

$g\left(-\frac{1}{2}x+1\right)$

$= -2\left(-\frac{1}{2}x+1\right)+2$

$= x - 2 + 2$

$= x$

HW p393
15-27odd
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